5

BEST MANAGEMENT PRACTICES

5.0 INTRODUCTION

ADOT requires contractors to prepare and implement a SSWPPP to control water pollution effectively during the construction process of all ADOT projects. As described in Chapter 4 of this manual, in order to complete the SWPPP for ADOT approval, the contractor is required to select those BMPs which will best control storm water pollution. This chapter provides instructions for the selection and implementation of BMPs. The BMPs described in this Chapter include both temporary and permanent erosion and sediment control practices. Each project presents unique conditions. These BMPs are provided as a "toolbox" to allow ADOT and the Contractor options to best address the requirements of the Arizona Construction General Permit.

Disturbed Soil Area Management
Limiting the amount of disturbed soil is a critical component in conducting an effective storm water management program. Section 104.09 of the Special Provisions states

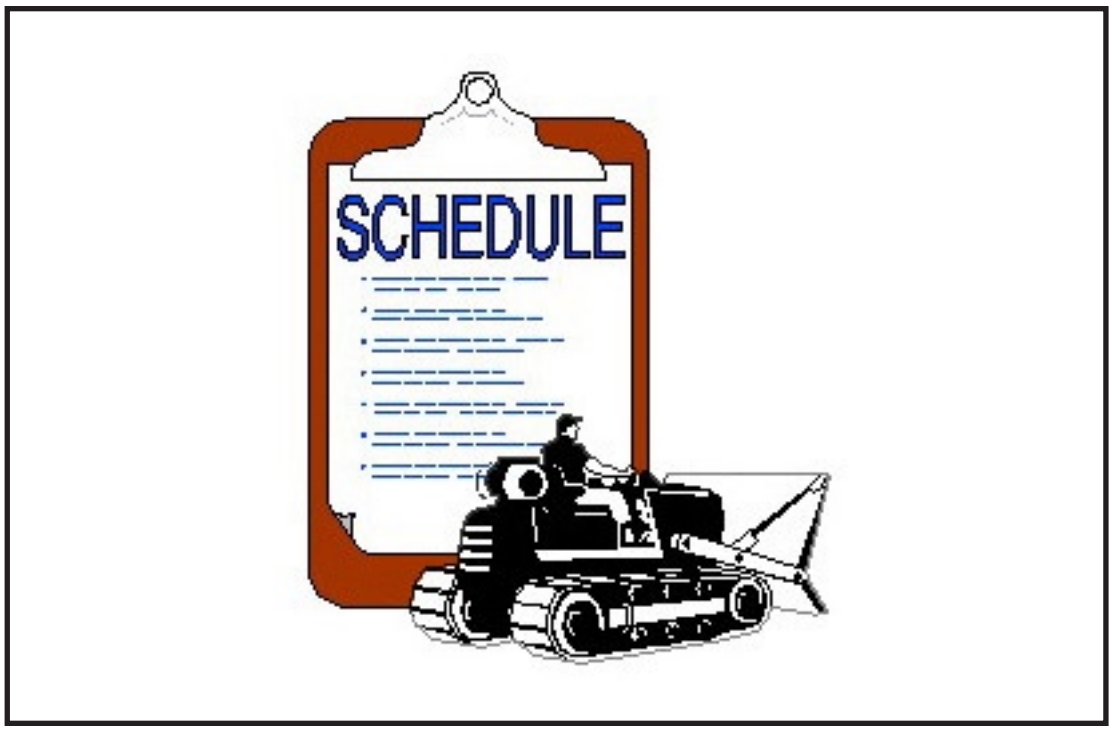
"*Unless otherwise approved in writing, the contractor shall not expose an area greater than 750,000 square feet in any one location within the project limits until the erosion control devices proposed for that portion of the project have been installed and accepted by the Engineer…. In addition, unless otherwise approved by the Engineer, erosion control measures for each slope that is not scheduled to be re-disturbed within 21 days shall be placed not later than 14 days after construction activity has temporarily or permanently ceased for that portion of the work*."

The Engineer may elect to further restrict the size of the project's total disturbed area during the rainy season.

5.1 SOIL STABILIZATION BEST MANAGEMENT PRACTICES

Soil stabilization consists of preparing the soil surface and applying one of the following BMPs, or a combination thereof, to disturbed soils areas.

Scheduling



5.1.1 Scheduling

Definition

The development of a schedule for every project that includes sequencing of construction activities in conjunction with the implementation of construction site BMPs in order to reduce the amount and duration of soil exposed by construction activities. The purpose is to minimize erosion of disturbed soils by wind, rain, runoff, and vehicle tracking.

Purpose

- To reduce the amount and duration of soil exposed to erosion.
- To ensure that BMPs are implemented in a timely manner as construction proceeds.

Appropriate Applications

- Construction activities shall be planned to minimize the amount of disturbed land exposed to erosive conditions.
- Stabilization measures shall be installed and maintained as work progresses, not just at the completion of construction.

Planning Considerations

- Schedule the installation of temporary and permanent controls as specified in the Construction General Permit.
- The schedule of construction activities and concurrent application of temporary and permanent BMPs is developed as part of the SWPPP.
- Schedule clearing and grubbing activity to allow existing vegetation to remain in place as long as possible.
- For larger projects, the contractor shall not expose more than 750,000 square feet in any location until temporary or permanent BMPs have been installed.
- Schedule shall include dates for significant long-term operations or activities that may have planned non-storm water discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, bridge cleaning, etc.
- Schedule shall include dates for installation of permanent drainage systems and runoff diversion devices. These devices should be installed as early as possible in the construction process.
- The schedule shall include non-storm water BMPs, waste management and materials pollution control BMPs.
- Stabilize non-active areas as specified in the CGP.
- Monitor weather forecast and adjust construction schedule to allow for the implementation of soil stabilization and sediment controls on all disturbed areas prior to the onset of rain.

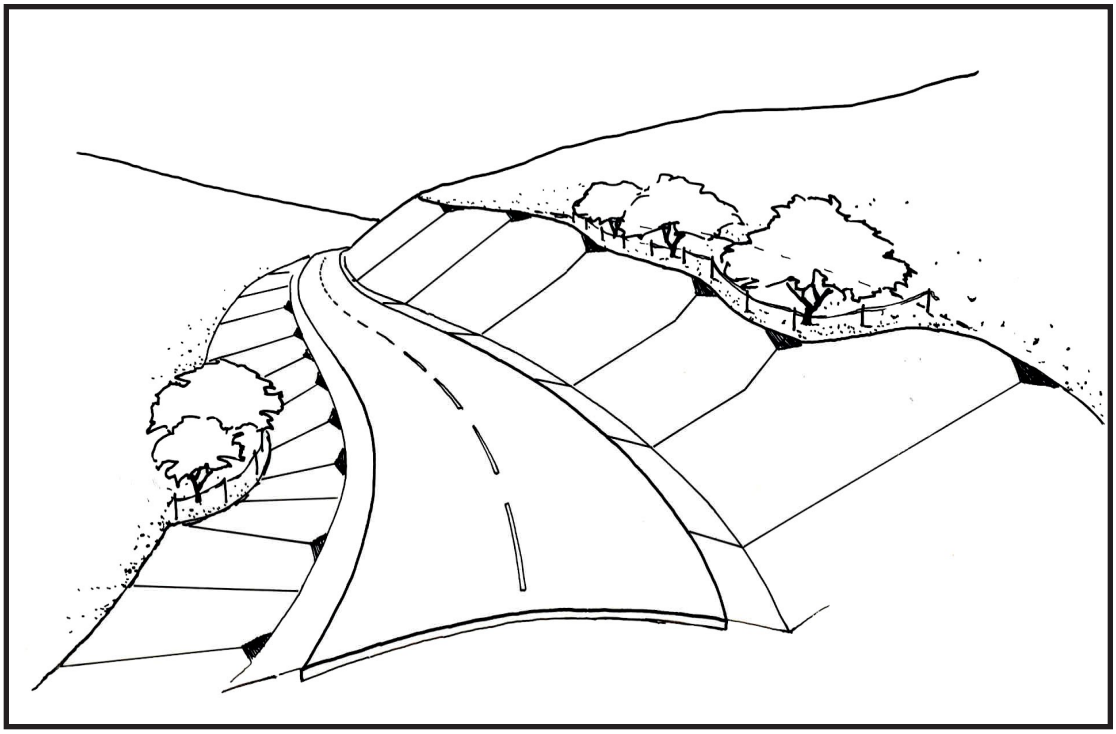
Inspections

- Verify that work is progressing in accordance with the schedule.

Maintenance

- The schedule must be updated when changes are warranted or when directed by the Engineer.

Preserve Existing Vegetation



5.1.2 Preserve Existing Vegetation

Definition

The carefully planned protection of trees and natural vegetated areas within the construction site or right-of-way in order to minimize the amount of bare soil exposed to erosive forces and provide vegetated areas to filter storm water runoff.

Purpose

- Reduce soil erosion, sediment transport, and tracking.
- Reduce maintenance.

Appropriate Application

- Protect trees and natural areas not in direct conflict with construction activities.

Limitations

- Difficult on sites with restricted access.
- Requires planning and may limit area available for construction activity.

Standards and Specifications

Timing

- Evaluate existing vegetation early in the planning process to adjust grading limits around high quality natural areas.
- Areas to be preserved in place shall be clearly marked at the site and identified on the project plans.
- Preservation of existing vegetation shall conform to scheduling requirements set forth in the special provisions.
- Clearing and grubbing and other soil-disturbing construction activities shall not be permitted prior to preservation of existing vegetation.

Design and Layout

- Areas to be preserved shall be marked with highly visible, non-metallic, temporary fencing as described in the project specifications.
- Temporary fencing shall be placed beyond the "dripline" of a tree by a distance that is 1½ times the length of the "dripline" radius.
- Temporary roads shall be constructed to minimize disturbance to existing vegetation and remain within limits of disturbance of permanent road.
- Construction materials, equipment storage, and parking areas shall be located where they will not cause root compaction.
- Waste materials including vegetation to be removed shall not be stored within the preserved area.

Construction Activities

- Where tree roots are disturbed, they shall be covered with soil as soon as possible.
- Damaged roots and limbs shall be cut cleanly.
- Seriously damaged trees shall be examined a trained arborist.
- Remove and replace trees if they are damaged seriously enough to affect their survival.
- Aerate soil where compaction occurs from construction activity.
- Immediately repair damage to irrigation systems.

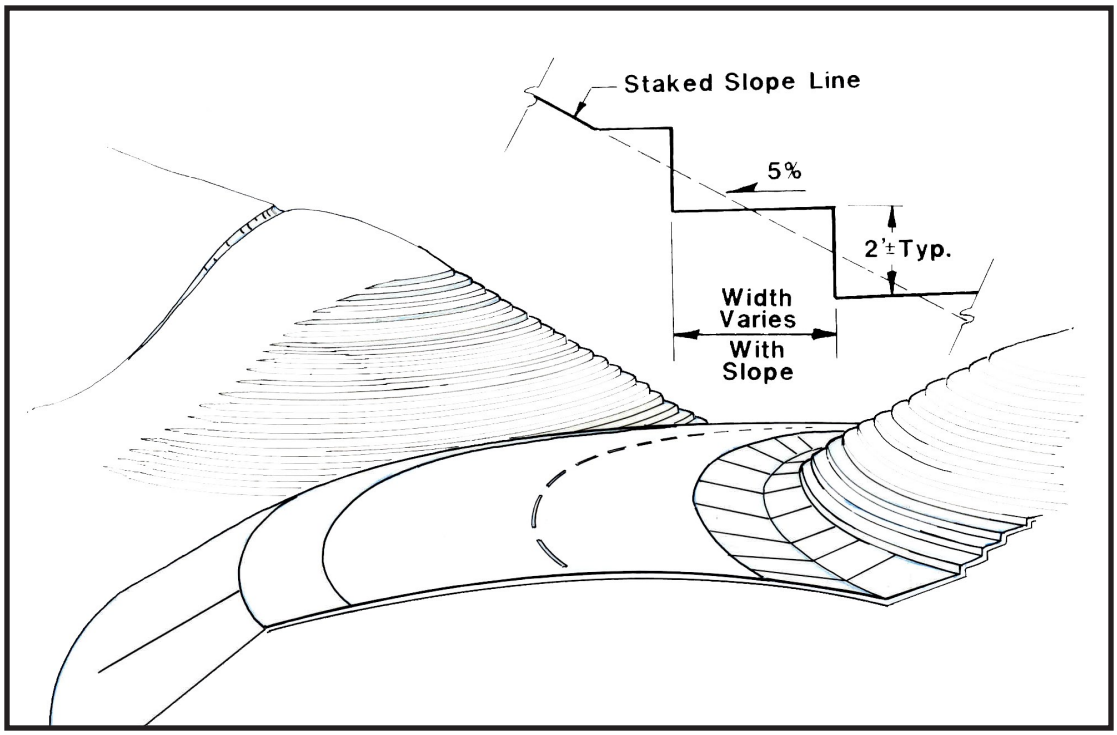
Inspections

- Follow inspection schedule required in CGP Part IV.H.
- Inspect the preservation fencing to ensure that it is intact and that there has been no encroachment into the preservation area.
- Evaluate preserv-in-place vegetation for signs of stress.

Maintenance

- Maintain preservation fencing as needed.
- After all other work is complete, fencing and barriers shall be removed last.
- Address unhealthy and declining vegetation as described in project specifications.

Minibenches/Slope Roughening



5.1.3 Minibenches/Slope Roughening

Definition

Terracing and roughening are techniques for creating furrows, terraces, serrations, stair-steps or track-marks on the soil surface.

Purpose

- To improve water infiltration.
- To increase the effectiveness of temporary and permanent soil stabilization practices.

Appropriate Applications

- Large engineered slopes, primarily cuts in rural settings.
- Soils prone to erosion.
- Prior to application of permanent seeding.

Limitations

- Not appropriate on rock slopes.
- Must be constructed as slope is cut.

Standards and Specifications

Planning Considerations

- Minibenching and slope roughening shall be constructed from the top of a cut slope down.

Design

- Minibenches, terraces, furrows, and other horizontal roughening techniques shall follow the contour.

Inspections and Maintenance

- Follow inspection schedule required in the CGP Part IV.H.
- Where horizontal roughening falls away from the contour, additional BMPs may be required to protect the slope.

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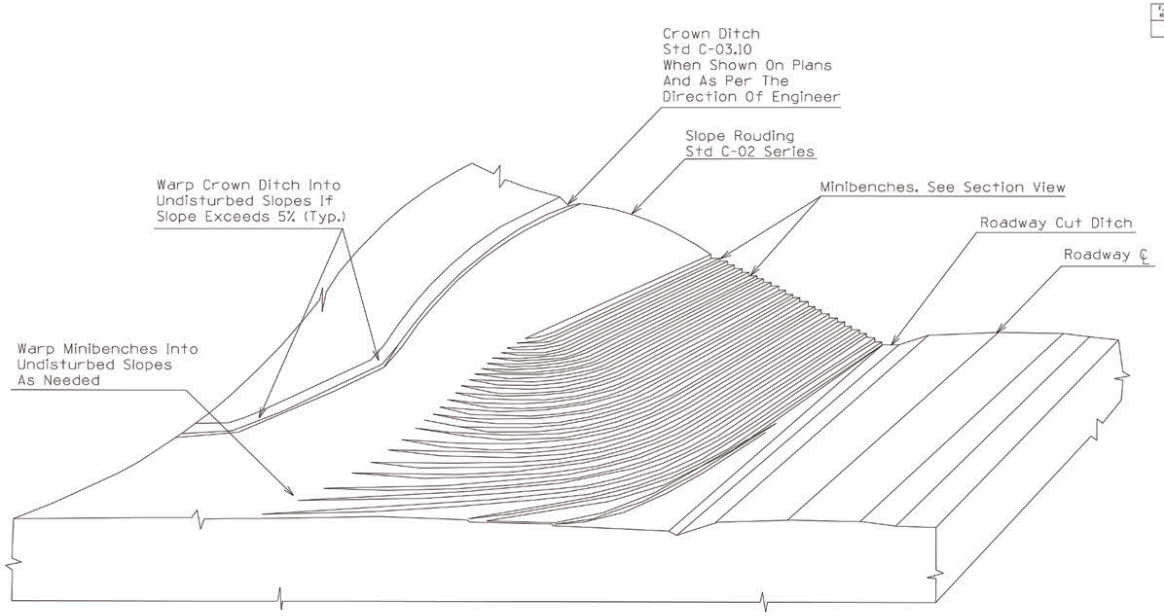
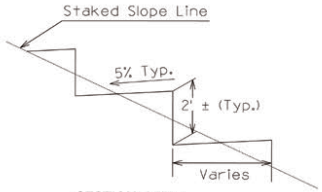
9	ARIZ.				



PERSPECTIVE VIEW OF MINIBENCHES



SECTION VIEW
MINI BENCHES
(N. T. S., Typ.)

GENERAL NOTES

1. Minibenches to be constructed horizontal
2. Apply slope rounding as per Section 203, Subsection 3.03(B) of the Standard Specifications.
3. Dimensions of the ditches are noted on plan sheets.
4. The horizontal dimension of the bench is a function of the staked slope line.
5. Apply seeding for revegetation and permanent erosion control, as slope is constructed.
6. Each bench must be constructed on the same elevation (contour line).

MINI BENCHING

DETAIL E7

	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION
DESIGN	LeRoy Brady	7/2002	INTERMODAL TRANSPORTATION DIVISION
DESIGN	Zitao Fang	7/2002	ROADSIDE DEVELOPMENT SECTION
DRAWN	Zitao Fang	7/2002	
DRAWN		2/2002	EROSION & SEDIMENT CONTROL DETAILS
CHECKED			
TEAM LEADER	LeRoy Brady	2/2002	
ROUTE	MP	LOCATION	SHEET OF
TRACS NO.		PROJECT NO.	___ OF ___

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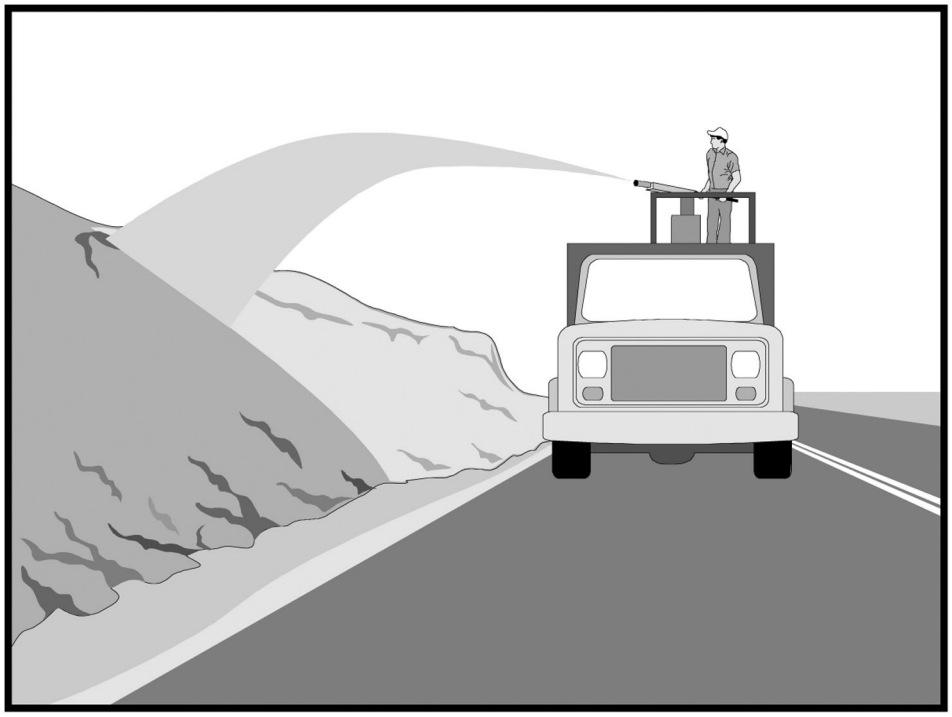
Hydraulic Mulch



5.1.4 Hydraulic Mulch

Definition

Hydraulic mulch consists of applying a mixture of shredded wood fiber or a hydraulic matrix (e.g., bonded fiber matrix), and a stabilizing emulsion or tackifier with hydro-mulching equipment. This will protect exposed soil from erosion by raindrop impact or wind. This is one of five temporary soil stabilization alternatives to consider.

Purpose

- Reduce soil erosion through temporary stabilization.

Appropriate Applications

- Temporary protection of disturbed areas until permanent measures (such as vegetation) are installed.
- Temporary protection of disturbed areas that must be re-disturbed following an extended period of inactivity.
- Hydraulic matrices typically are effective for longer periods of time.

Limitations

- Wood fiber hydraulic mulches are typically short-lived (less than a growing season).
- Hydraulic tackifiers typically require 24 hours to cure to be effective. Therefore,

should not be applied immediately prior to a storm event.

Standards and Specifications

- Apply as specified in project documents or by manufacturer.
- Soil surface must be loose at time of application.
- Area to be mulched shall be completely covered.
- Avoid overspray onto existing pavements, structures and vegetation.
- Selection of hydraulic mulches by the contractor must be approved by the Engineer prior to use.

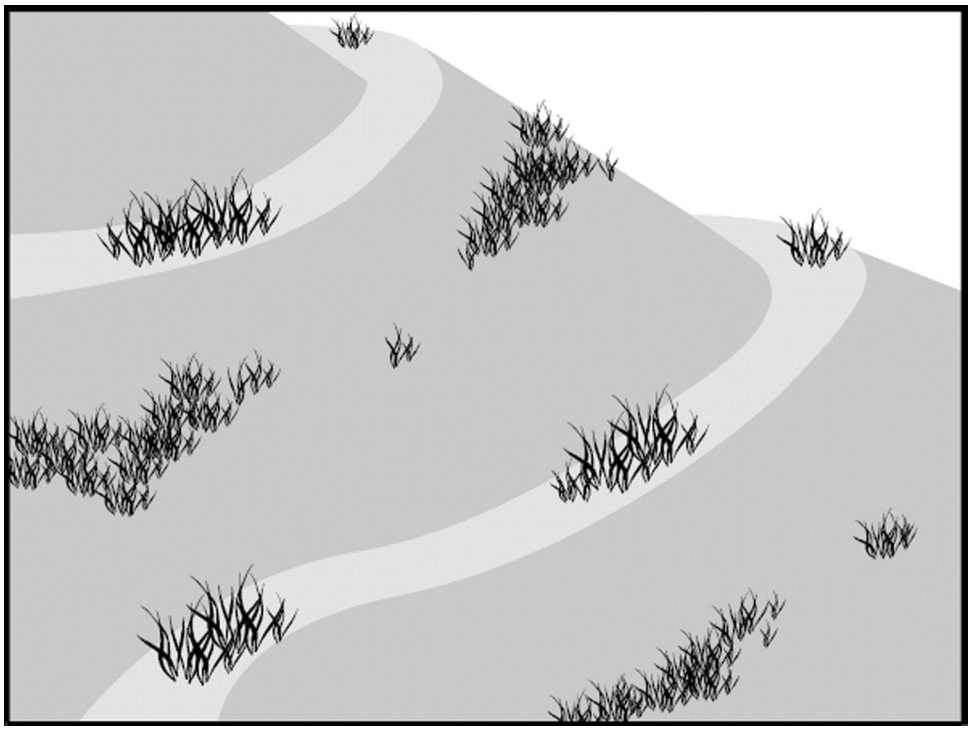
Inspections

- Follow inspection schedule required in the CGP Part IV.H.
- Inspect after all rainfall events.

Maintenance

- Maintain an unbroken ground cover throughout the period of construction the soils are not being reworked.

Hydroseeding



5.1.5 Hydroseeding

Definition

Hydroseeding typically consists of applying a mixture of fiber, seed, fertilizer, and stabilizing emulsion with hydro-mulch equipment, which protects exposed soils from erosion by water and wind. This is one of five temporary soil stabilization alternatives to consider.

Purpose

Reduce soil erosion through temporary soil stabilization.

Appropriate Applications

- Application of seed for permanent revegetation and stabilization of disturbed soils.
- Temporary protection of disturbed areas until permanent measures (e.g., vegetation) are installed.
- Temporary protection of disturbed areas that must be re-disturbed following an extended period of inactivity.

Limitations

- Straw mulching may be necessary in addition to hydroseeding in order to promote establishment of vegetation.

- Steep slopes are difficult to protect with temporary seeding.
- Dry or cold weather will affect vegetative establishment.

Standards and Specifications

- Site conditions must be evaluated prior to determining suitable species selection and application rates. Attributes such as soil types, topography, local climate and season, maintenance requirements, proximity of sensitive areas (e.g., live streams), and existing native vegetation types.
- Prior to use, ADOT shall approve application rates for mulches, tackifier, soil amendments and seed mixtures as per specifications prior to application.
- All seed shall be in conformance with requirements of the project specifications.
- Areas to be seeded shall be filled as described in project specifications. Soil shall be loose and friable.

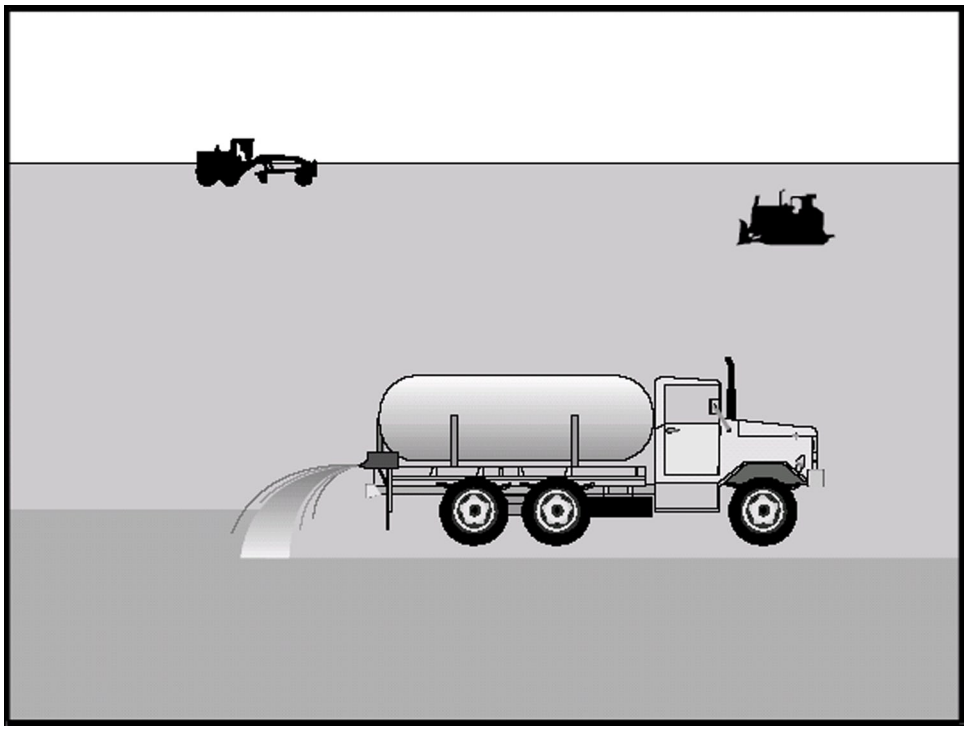
Inspections

- Follow inspection schedule required in the CGP Part IV.H and project specifications.

Maintenance

- Any temporary revegetation efforts that do not provide adequate cover must be revegetated as required by the Engineer.

Soil Binders



5.1.6 Soil Binders

Definition

Soil binders consist of applying and maintaining polymeric or lignin sulfonate soil stabilizers or emulsions. Soil binders are materials applied to the soil surface to temporarily prevent water-induced erosion of exposed soils on construction sites. Soil binders typically also provide dust, wind, and soil stabilization (erosion control) benefits. This is one of five temporary soil stabilization alternatives to consider.

Purpose

- Reduce soil erosion through temporary soil stabilization.

Appropriate Applications

- Temporary protection of disturbed areas until permanent measures (e.g., vegetation) are installed.
- Temporary protection of disturbed areas that must be re-disturbed following a period of inactivity. Because they can be often incorporated back into the work, they may be a good choice where grading activities will soon resume.

Limitations

- Soil binders are temporary in nature and may require reapplication, especially after heavy or prolonged rainfall.
- Typically require a cure time of approximately 24 hours.
- Easily disturbed by vehicular or pedestrian traffic.
- Do not adhere well to compacted or dense (clay) soils.
- May not perform well under conditions of low relative humidity or low temperatures.
- May be slippery if oversprayed onto vehicular travelways.

Standards and Specifications

General Considerations

- Site conditions (soil type, temperature and humidity) must be evaluated prior to determining appropriate soil binder type.
- Regional soil types will dictate appropriate soil binders to be used.
- Must be environmentally benign (non-toxic to existing plants and wildlife).

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided on Table 5.1.6. In consultation with the Engineer, use Table 5.1.6 to select an appropriate soil binder.

Factors to consider when selecting a soil binder include the following:

- Suitability to situation – Consider where the soil binder will be applied: if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time soil stabilization will be needed, and if the soil binder will be placed in an area where it will degrade rapidly. In general, slope steepness is not a discriminating factor for the listed soil binders. The soil binders in Table 5.1.6 may also be used for dust control using the provided dust control application rates. The dust control application rates will not be adequate to provide protection from water-induced erosion.
- Soil types and surface materials – Fines and moisture content are key properties of surface materials. Consider a soil binder's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials.
- Frequency of application – The frequency of application can be affected by subgrade conditions, surface type, traffic volumes, climate, and maintenance schedule.

Frequent applications could lead to high costs. Application frequency may be minimized if the soil binder has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment clean-up.

After considering the above factors, the soil binders in Table 5.1.6 will be generally appropriate as follows:

Copolymer: Appropriate for long term soil stabilization in areas where cross-traffic might occur, or where stabilization needs to be achieved in conjunction with preserving existing vegetation. Longevity can be up to 2 years, it has a high resistance to abrasion, and is compatible with existing vegetation. However, it is also relatively costly which makes it less desirable for short-term or frequent applications.

Lignin sulfonate: Appropriate for short- or medium-term soil stabilization applications in low traffic areas. The moderate relative cost makes it less desirable to reapply frequently, though it typically lasts longer than psyllium or guar. With only moderate penetration and a low resistance to abrasion, it would be more suited to areas which will not be disturbed frequently by construction activities.

Psyllium/Guar: Appropriate for typical soil stabilizing situations or short-term applications. Because of the relatively low cost, they can be applied more frequently. Their high penetration provides good stabilization but their moderate resistance to abrasion limits their longevity. They are not very compatible with vegetation.

Applying Soil Binders

After selecting an appropriate soil binder, the untreated soil surface must be prepared before applying the soil binder. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps shall be followed:

- Follow manufacturer's recommendations for application rates, pre-wetting of application area and cleaning of equipment after use.
- Prior to application, roughen embankment and fill areas. Track walking shall only be used where rolling is impractical.
- Soil binders shall not be applied during or immediately before rainfall.
- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Do not apply soil binders to frozen soil, areas with standing water, under freezing or rainy conditions, or when temperature is below 4 º (40ºF).

- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.
- Generally, soil binders require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure times.

For liquid agents:

- Crown or slope ground to avoid ponding.
- Uniformly pre-wet ground at 0.14 to 1.4 l/m² (0.03 to 0.3 gal/yd²) or according to manufacturer's recommendations.
- Apply solution under pressure. Overlap solution 150 to 300 mm (6 to 12 inches).
- Allow treated area to cure for the time recommended by the manufacturer, typically, at least 12 hours.
- Apply second treatment before the first treatment becomes ineffective, using 50% application rate.
- In low humidities, reactivate chemicals by re-wetting with water at 0.5 to 0.9 l/m² (0.1 to 0.2 gal/yd²).

Maintenance and Inspection

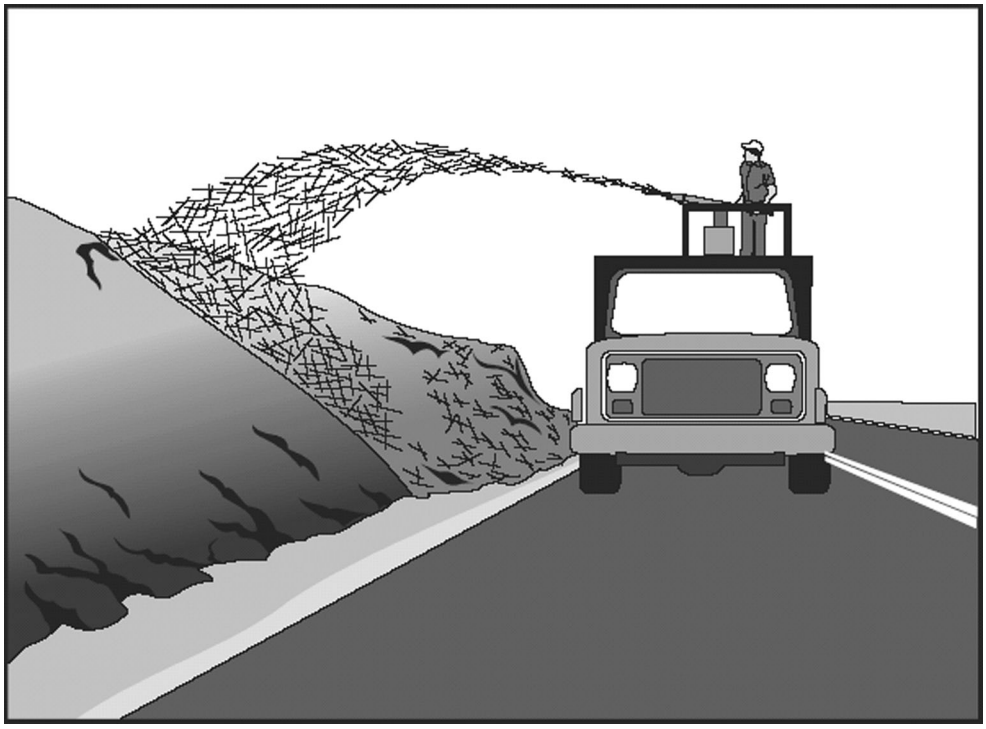
- Reapplying the selected soil binder may be needed for proper maintenance. High traffic areas shall be inspected on a daily basis, and lower traffic areas should be inspected on a weekly basis.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

Properties of Soil Binders for Erosion Control

Chemicals	Copolymer	Lignin Sulfonate	Psyllium	Guar
Comments	- Forms semi-permeable transparent crust. - Resists ultraviolet radiation and moisture induced breakdown	- Paper industry waste produce - Acts as dispersing agent- Best in dry climates- Can be slippery	- Effective on dry, hard soils - Forms a crust	- Effective on dry, hard soils - Forms a crust
Relative Cost	High	Moderate	Low	Low
Environmental Hazard	Low	Low	Low	Low
Penetration	Moderate	Moderate	High	High
Evaporation	Moderate	Moderate	Moderate	Moderate
Resistance to Leaching	Low	High	High	High
Resistance to Abrasion	High	Low	Moderate	Moderate
Longevity	1 to 2 years	6 months to 1 year	3 to 6 months	3 to 6 months
Minimum Curing Time before Rain	24 hours	24 hours	24 hours	24 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Chemically Degradable	Biologically/Physicall-y/Chemically Degradable	Biologically Degradable	Biologically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Yes	Yes	Yes	Yes
Liquid/Powder	Liquid	Powder	Powder	Powder
Surface Crusting	Yes	Yes, but dissolves on rewetting	Yes, but dissolves on rewetting	Yes, but dissolves on rewetting
Clean-Up	Solvents	Solvents	Water	Water
Erosion Control Application Rate	Apply 800-1,000l/ha (85-110 gal/ac).	Apply 5,600-6,500 l/ha (600-700 gal/ac).	Apply 170 kg/ha (150 lb./ac) with 560-2,200 kg/ha (500-2,000 lbs./ac) fiber mulch.	Apply 110-220 kg/ha (100-200 lbs./ac) with 560-2,200 kg/ha (500-2,000 lbs./ac) fiber mulch.
Dust Control Application Rate	Apply 280-520 L/ha (30-55 gal/ac).	Loosen surface 25-50mm (1-2 in). Need 4-8% fines. Apply 470-1,900 l/ha (50-200 gal/ac).	Apply 170 K/ha (150 lbs./ac).	Apply at 45-70 K/ha (40-60 lbs./ac).

Table 5.1.6

Straw Mulch



5.1.7 Straw Mulch

Definition

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil by mechanical means (e.g., a drill or studded roller) or anchoring it with tackifier. This is one of five temporary soil stabilization alternatives to consider.

Purpose

- Reduce soil erosion through temporary soil stabilization.

Appropriate Applications

- Straw mulch is used for soil stabilization as a temporary surface cover on disturbed areas until soils can be prepared for final stabilization.
- Typically used in combination with temporary and/or permanent seeding applications to enhance plant establishment.

Limitations

- Where mechanical straw blowers are used, application areas are typically limited to within approximately 150 feet of equipment. Therefore, for large slopes frequent mobilizations and applications are necessary.
- Application of straw mulch by hand is typically expensive.

- Potential for accidental introduction of undesirable weed species.
- Blown straw is potentially a nuisance when applied in urban areas.

Standards and Specifications

- Materials shall conform to and shall be applied at rates specified in special provisions.
- Straw shall be certified to be free of weeds and invasive species.
- When applied by blower, avoid overspray onto existing pavements, structures and vegetation.
- On slopes less steep than 2 (horizontal): 1 (vertical) and where mechanical action will not contribute to soil compaction, straw can be "punched" into the soil using a knife-blade roller or a straight bladed coulter ("crimper").
- For small areas, straw can be anchored by hand tools.

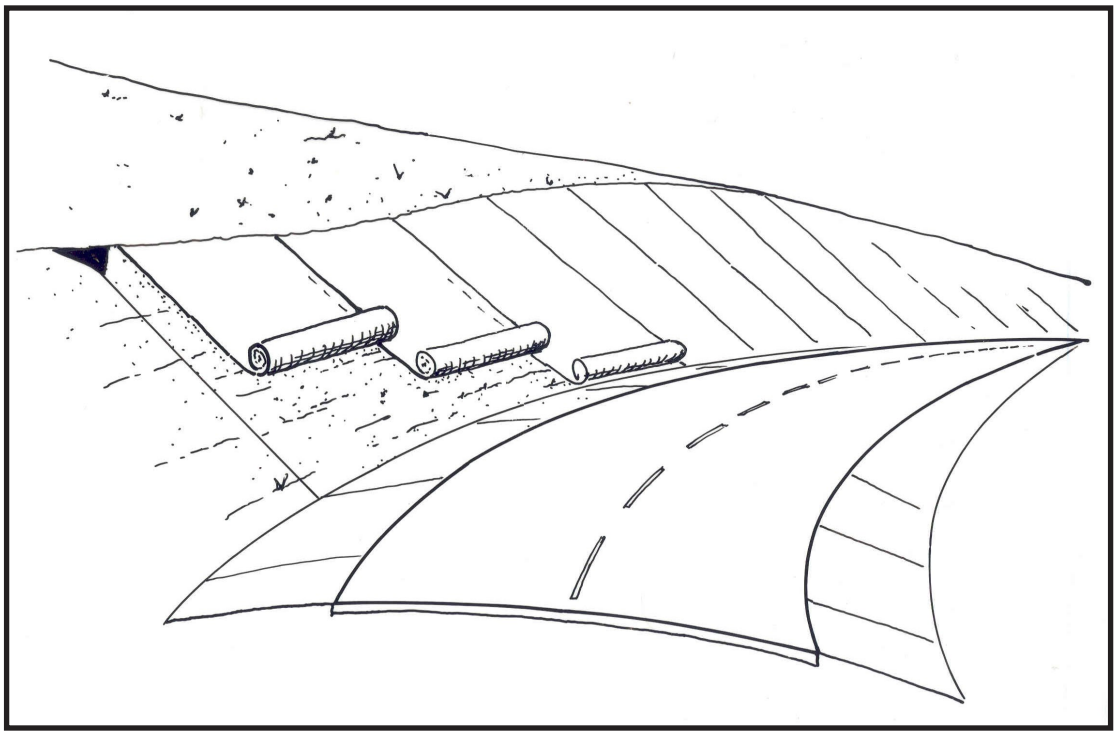
Inspections

- Follow inspection schedule required in the CGP Part IV.H.

Maintenance

- Reapply mulch when more than 20% bare ground is exposed in application area.

Geotextiles, Plastic Covers, Erosion Control Blankets/Mats



5.1.8 Geotextiles, Plastic Covers and Erosion Control Blankets/Mats

Definition

A natural (excelsior, straw, coconut, etc.) or synthetic (usually polyethelene) material installed to reduce soil erosion by wind or water. This is one of five soil stabilization alternatives to consider.

Purpose

- Reduce rainfall impact.
- Provide a microclimate to promote seedling establishment.
- Protect exposed soil from wind and rain.
- Reduce erosiveness of concentrated flows.

Appropriate Applications

- Steep slopes (typically greater than 3 horizontal: 1 vertical).
- Slopes with highly erosive soils or where the erosion hazard is high.
- Slopes adjacent to bodies of water.
- Concentrated flow areas such as ditches and channels with flows exceeding 3.3 ft/sec. (refer to ADOT Hydraulic Manual for channel lining criteria).
- In areas where plant establishment is likely to be slow.
- Areas inaccessible to hydraulic equipment.

- Stockpiles.

Limitations

- Costly.
- Not suitable for excessively rocky sites or rough slopes.
- Not suitable for areas where vegetation will be mowed.
- Plastic sheeting is easily disturbed and must be removed and disposed of prior to
- Application of permanent soil stabilization measures. Plastic also results in increased runoff rates.
- May trap wildlife.

Standards and Specifications

Material Selection

There are a wide variety of types and materials from which to choose. Selection shall be based on needs for the specific project. Factors to consider include:

- Cost: materials, site preparation, installation.
- Effectiveness: reduction of erosion, flow velocity, and runoff.
- Acceptability: environmental compatibility, regulatory, and aesthetic concerns.
- Vegetation enhancement: moisture retention, temperature modification.
- Installation: durability, longevity, ease of installation, safety.
- Maintenance.

Geotextiles:

Material shall be woven polypropylene fabric with minimum thickness of 0.5 inches, minimum width of 12 feet and shall have minimum tensile strength of 50 lbs/ ft (0.67 kN) (warp) 25 lbs/ ft. (0.36 kN) (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric shall be approximately 0.07 sec^{-1} in conformance with the requirements in ASTM Designation: D4491. The fabric shall have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets shall be secured in place with wire staples or sandbags and by keying into tops of slopes to prevent infiltration of surface waters under

Geotextiles may be reused if, in the opinion of the RE, they are suitable for the use intended.

Geotextiles, Plastic Covers, Erosion Control Blankets/Mats

Plastic Covers:
Material shall be polyethylene sheeting and shall have a minimum thickness of 6 mm. Plastic covers shall be anchored by sandbags placed no more than 10 feet apart and by keying into the tops of slopes to prevent infiltration of surface waters under the plastic. All seams shall be taped or weighted down their entire length, and there shall be at least 12 inches to 24 inches overlap of all seams.

Plastic covers may be reused if, in the opinion of the engineer, they are suitable for the use intended.

Erosion Control Blankets/Mats:
Blankets and Mats are available in materials with a wide variety of susceptibility to biological and photo-degradation. The most common materials in order of least to most durable are:

- Agricultural straw.
- Jute fiber.
- Wood fiber (Excelsior).
- Coconut fiber (coir).

Site Preparation

- Proper site preparation is essential to ensure complete contact of the blanket or matting with the soil.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil. Contractor shall cut material to fit around large boulders.
- If areas is to be seeded, prepare soil as directed in the project specifications before applying covering.

Seeding
Seed the area before blanket installation for erosion control and revegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be re-seeded. Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Anchoring

- U-shaped wire staples, metal pins or wooden stakes can be used to anchor mats and blankets to the ground surface.
- Staples shall be made of .12 inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown. Wire staples shall be minimum of 11 gauge.

- Metal stake pins shall be 0.188-inch diameter steel with a 1.5 inch steel washer at the head of the pin.
- Wire staples and metal stakes shall be driven flush to the soil surface.
- All anchors shall have sufficient ground penetration to resist pullout by wind. Longer anchors may be required for loose soils.

Installation on Slopes

Always consult the manufacturer's recommendations for installation. In general, these will be as follows:

1. Begin at the top of the slope and anchor the blanket in a 12-inch deep trench. Backfill trench, tamp earth firmly and staple every 12 inches.
2. Unroll blanket downslope in the direction of water flow.
3. Overlap the edges of adjacent parallel rolls 4 inches and staple every 12 inches.
4. When blankets must be spliced, place blanket ends in common trench as described above with 6-inch overlap. Staple through overlapped area, approximately 6 inches apart.
5. Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
6. Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples shall be placed down the center and staggered with the staples placed along the edges.
7. On steep slopes, 1:1 (V:H) to 1:2 (V:H), require a minimum of 2 staples/yd². Moderate slopes, 1:2 (V:H) to 1:3 (V:H), require a minimum of 1 ½ staples/yd², placing 1 staple/yd on centers. Gentle slopes require a minimum of 1 staple/yd².

Installation in Channels

Always consult the manufacturer's recommendations for installation. In general, these will be as follows:

1. Dig initial anchor trench 12 inches deep and 6 inches wide across the channel at the lower end of the project area.
2. Excavate intermittent check slots, 6 inches deep and 6 inches wide across the channel at 25- to 30 foot-intervals along the channels.
3. Cut longitudinal channel anchor slots 4 inches deep and 4 inches wide along each side of the installation to bury edges of matting, whenever possible extend matting 2 inches to 3 inches above the crest of the channel side slopes.
4. Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12 inches intervals. Note: matting will initially be upside down in anchor trench.
5. In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 inches.

6. Secure these initial ends of mats with anchors at 12-inch intervals, backfill and compact soil.Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 3-inch overlap.
7. Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 12-inch intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.

Alternate method for non-critical installations:

1. Place two rows of anchors on 6-inch centers at 25- to 30-foot intervals in lieu of excavated check slots.
2. Shingle-lap spliced ends by a minimum of 12 inches apart on 12-inch intervals.
3. Place edges of outside mats in previously excavated longitudinal slots, anchor using prescribed staple pattern, backfill and compact soil.
4. Anchor, fill and compact upstream end of mat in a 12 inches by 6 inches terminal trench.
5. Secure mat top ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
6. Seed and fill turf reinforcement matting with soil, if specified.

Soil filling (if specified for turf reinforcement)

- Always consult the manufacturer's recommendations for installation.
- Do not drive tacked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes or brooms for fine grading and touch up. Smooth out soil filling; just exposing top netting of mat.

Removal

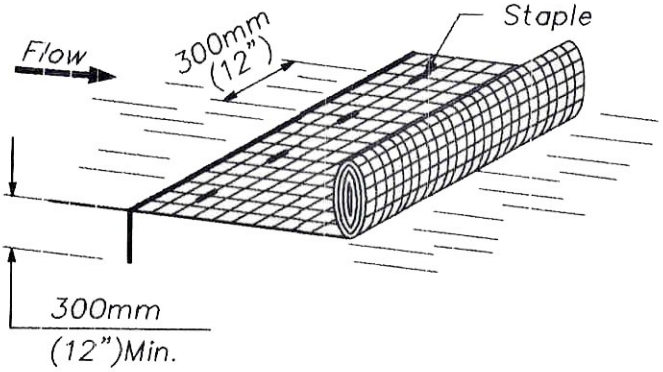
When no longer required for the work, coverings shall become the property of the Contractor and shall be disposed of outside the highway right of way in conformance with the special provisions.

Inspections

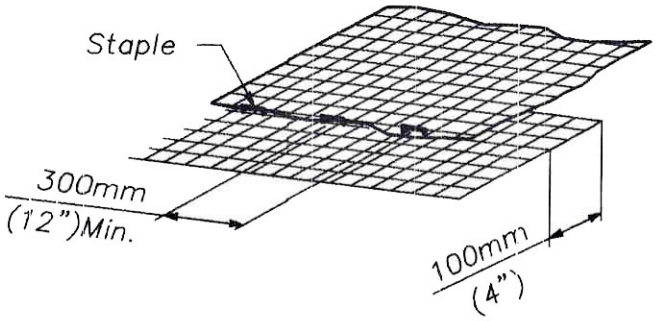
- Follow inspection schedule required in CGP Part IV.H.
- Erosion may occur under blankets in areas were contact with soil has been compromised. This damage may be difficult to detect and repair.

Maintenance

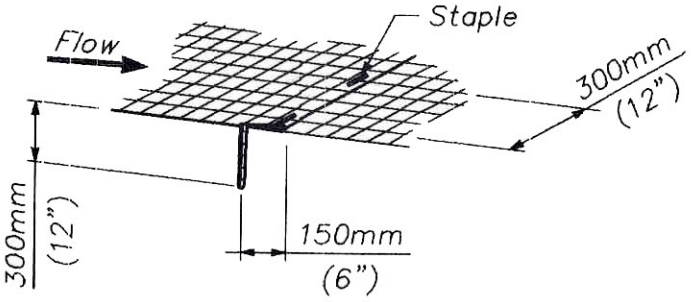
- Re-anchor loosened matting and replace lost matting and staples as required.
- Repair slope or channel damage before re-installing matting if washout or breakage occurs.



ANCHOR SLOT: Bury the up-slope end of the net in a 300mm (12") deep trench. Tamp the soil firmly. Staple at 300mm (12") intervals across the net.



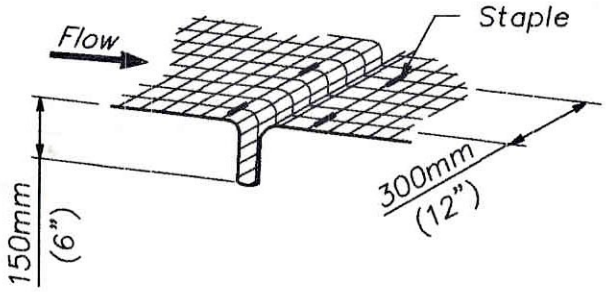
OVERLAP: Overlap longitudinal edges of adjoining mattings at least 100mm (4"). Staple every 300mm(12") down the edge of the overlapping net.



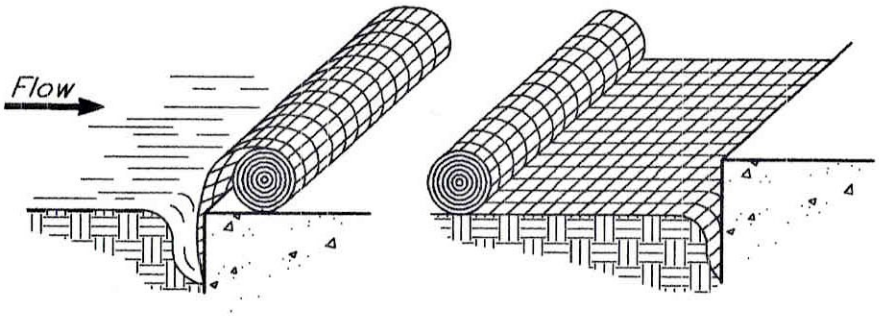
JOINING MATS: Insert the roll in a trench; as with the anchor slot. Overlap the up-slope end of the roll a min. of 150mm (6"). Staple at 150mm (6") intervals along the end of the up-scale net.

INSTALLATION OF MATTING

not to scale



CHECK SLOTS: On erodible soils or steep slopes, check slots should be placed every 4.5m (15'). Insert a fold of the mat into a 150mm (6") trench and tamp firmly, staple at 300mm (12") intervals across the mat on each side of the check slot. Lay the mat smoothly on the surface of the soil -- Do Not stretch the mat and Do Not allow wrinkles.



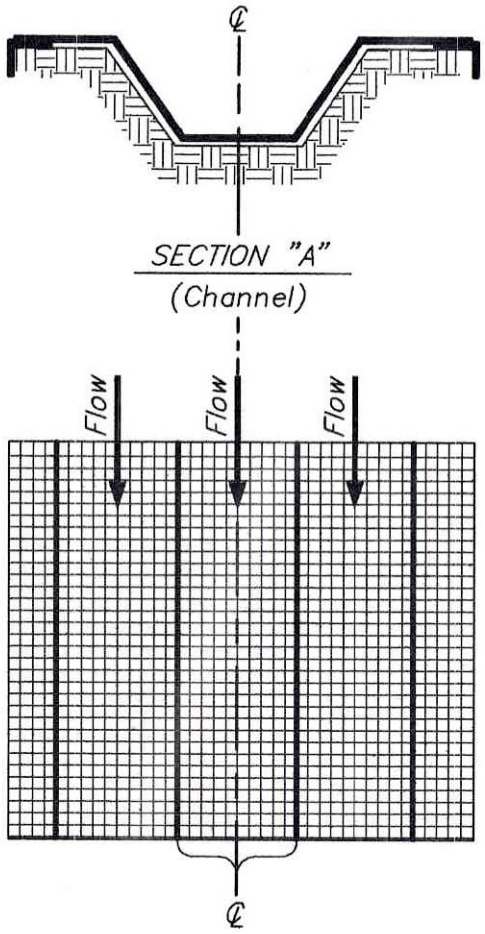
ANCHORING ENDS AT STRUCTURE: Place the end of the mat in a 300mm (12") slot on the up-channel side of the structure. Fill the trench and tamp firmly. Roll the net up the channel. Place staples at 300mm (12") intervals along the anchor end of the net.

INSTALLATION OF MATTING

not to scale

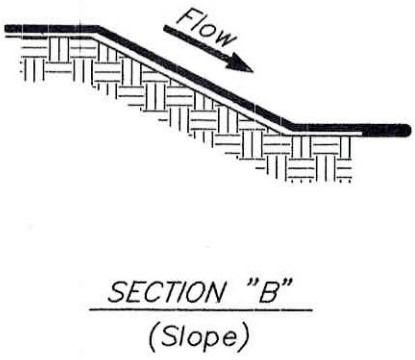
Apply matting parallel to the direction of flow. Use check slots every 4.5 Meters (15 feet). Center first strip in the center of channel.

Apply matting parallel to the direction of the flow on slopes of 25% or greater.

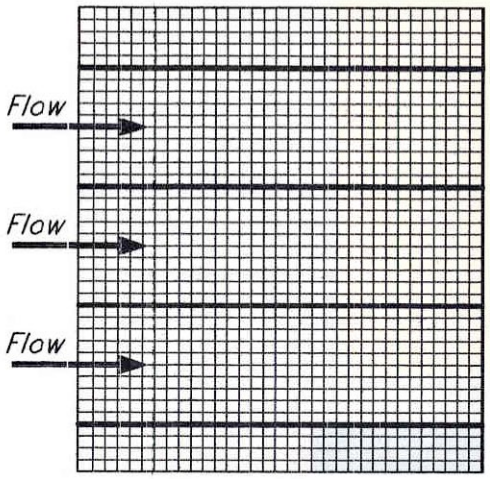


SECTION "A"
(Channel)

PLAN "A"
(Channel)



SECTION "B"
(Slope)



PLAN "B"
(Slope)

MATTING ORIENTATION

not to scale

Compost/Wood Mulching

5.1.9 Compost/Wood Mulching

Definition

Compost or wood mulching consists of applying a mixture of compost, shredded wood mulch or bark.

Purpose

- To temporarily protect exposed soil from wind, raindrop impact, increase infiltration and reduce runoff.
- To provide a suitable microclimate to promote seed germination.
- To prevent surface compaction or crusting.

Appropriate Applications

- Temporary soil stabilization.
- Shredded bark mulch may be applied to smaller drainage channels to reduce runoff velocities and soil erosion.
- Sensitive areas may be mulched at the end of a day's operations if rain is predicted.
- In conjunction with seed to encourage seed germination and establishment.

Mulches that are susceptible to erosion by wind or water are anchored to the soil using a variety of techniques.

- Crimping, tracking, disking or punching.
- Hydraulic bonding using a variety of organic or acrylic tackifiers.
- Covering with netting and stapled

Limitations

- Susceptible to wind disturbance.
- Potential for accidental introduction of undesirable weed species.
- Areas where hydraulically bonded mulches are to be applied must be accessible to equipment used in the process.
- Hydraulically bonded mulches require 24 hours to dry before rainfall occurs to be effective.
- Shredded wood mulch will not withstand significant concentrated flows and is prone to sheet erosion.

Standards and Specifications

Mulch Selection

There are many different types of mulches. Selection on type shall be based on type of application and site conditions. Prior to use, choice of mulch shall be approved by the Landscape Architect.

- Shredded wood and wood chips)–may be available from existing suitable vegetation to be cleared from site.
- Compost – typically applied as a component of seeding applications; shall be tested as described in the special provisions for biotic and abiotic factors.

Installation

- May be applied by hand or by mechanical or hydraulic methods.

Inspections

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for exposed areas of soil or where covering is broken.

Maintenance

- Reapply mulch when more than 20% bare ground is exposed in application area.